

**What is claimed is**

1. A gene coding a protein involved in carotenoid biosynthesis, which has nucleotide sequences selected from a group consisting of nucleotide sequences represented by SEQ. ID. No 5, No 7, No 9, No 11, No 13 and No 15.
2. The gene as set forth in claim 1, wherein the gene has nucleotide sequences of *crtW* coding  $\beta$ -carotene ketolase and represented by SEQ. ID. No 5.
3. The gene as set forth in claim 1, wherein the gene has nucleotide sequences of *crtZ* coding  $\beta$ -carotene hydroxylase and represented by SEQ. ID. No 7.
4. The gene as set forth in claim 1, wherein the gene has nucleotide sequences of *crtY* coding lycopene cyclase and represented by SEQ. ID. No 9.
5. The gene as set forth in claim 1, wherein the gene has nucleotide sequences of *crtI* coding

phytoene desaturase and represented by SEQ. ID.  
No 11.

5 6. The gene as set forth in claim 1, wherein the  
gene has nucleotide sequences of *crtB* coding  
phytoene synthase and represented by SEQ. ID.  
No 13.

10 7. The gene as set forth in claim 1, wherein the  
gene has nucleotide sequences of *crtE* coding  
geranylgeranyl pyrophosphate synthase and  
represented by SEQ. ID. No 15.

15 8. A *crt* gene containing all the genes of claim 2  
~ claim 7 and represented by SEQ. ID. No 4.

20 9. A protein encoded by the gene of claim 1,  
which has nucleotide sequences selected from a  
group consisting of nucleotide sequences  
represented by SEQ. ID. No 6, No 8, No 10, No  
12, No 14 and No 16.

10. A recombinant vector containing the *crt* gene  
of claim 8.

11. The recombinant vector as set forth in claim 10, wherein the vector is pCR-XL-TOPO-crtfull having a cleavage map represented in FIG. 16.
- 5 12. An *E. coli* transformant transformed with the recombinant vector of claim 11.
13. A method for producing carotenoid comprising the following steps:
- 10 1) Cloning the *crt* gene of claim 8;
- 2) Constructing a recombinant vector in which the *crt* gene of the above step 1) was inserted;
- 15 3) Transfecting a host cell with the recombinant vector of the step 2); and
- 4) Recovering carotenoids from the culture cells in which a strain transformed with the above recombinant vector was being cultured.
- 20 14. The method as set forth in claim 13, wherein the recombinant vector is that of claim 11.
15. The method as set forth in claim 13, wherein
- 25 the host cell is *E. coli* or yeast.

16. The method as set forth in claim 13, wherein  
the recovery of carotenoids is performed from  
the culture cells in which the *E. coli* was  
being cultured.
17. The method as set forth in claim 13, wherein  
the cartenoid is  $\beta$  -carotene or astaxanthine.
18. A *Paracoccus haeundaensis* producing  
astaxanthine, which has a 16S rDNA nucleotide  
sequence represented by SEQ. ID. No 3.
19. The *Paracoccus haeundaensis* as set forth in  
claim 18, wherein the strain is represented by  
accession No: KCCM-10460.